TP1_1

Aness_Hebbar

ACP Jussac

Loading Data

```
Jussac <- read.table("Jussac.txt", header = TRUE) # importation du jeu
summary(Jussac)
```

```
##        no             LCB           LMS              LBM              LP
##  Min.   :100.0   Min.   :129   Min.   : 64.0   Min.   :52.00   Min.   :16.70
##  1st Qu.:110.5   1st Qu.:187   1st Qu.: 97.0   1st Qu.:67.50   1st Qu.:19.55
##  Median :121.0   Median :212   Median :111.0   Median :72.00   Median :20.50
##  Mean   :144.2   Mean   :205   Mean   :106.5   Mean   :72.53   Mean   :21.06
##  3rd Qu.:201.5   3rd Qu.:226   3rd Qu.:118.0   3rd Qu.:77.50   3rd Qu.:22.90
##  Max.   :300.0   Max.   :255   Max.   :126.0   Max.   :95.00   Max.   :26.50
##        LM             LAM           Type               Iden
##  Min.   :11.50   Min.   :13.0   Length:43          Length:43
##  1st Qu.:13.25   1st Qu.:15.2   Class :character   Class :character
##  Median :14.30   Median :16.8   Mode  :character   Mode  :character
##  Mean   :14.30   Mean   :16.9
##  3rd Qu.:15.10   3rd Qu.:18.4
##  Max.   :16.80   Max.   :27.0
```

```
head(Jussac)
```

```
##    no LCB LMS LBM   LP   LM  LAM Type      Iden
## 1 100 129  64  95 17.5 11.5 13.8    1  bull-dog
## 2 101 154  74  76 20.0 14.2 16.5    1  bull-dog
## 3 102 170  87  71 17.9 12.3 15.9    1 chien-ind
## 4 103 188  94  73 19.5 13.3 14.8    1 chien-ind
## 5 104 161  81  55 17.1 12.1 13.0    1 chien-ind
## 6 105 164  90  58 17.5 12.7 14.7    1 chien-ind
```

```
J = Jussac[43,2:7]
Jussac <- Jussac[-43,]
attach(Jussac)
```

```
row.names(Jussac) <- no
TP <- as.factor(Type)
Juss <- data.frame(Jussac[,2:7])
head(Juss)
```

```
##     LCB LMS LBM   LP   LM  LAM
## 100 129  64  95 17.5 11.5 13.8
## 101 154  74  76 20.0 14.2 16.5
## 102 170  87  71 17.9 12.3 15.9
## 103 188  94  73 19.5 13.3 14.8
## 104 161  81  55 17.1 12.1 13.0
## 105 164  90  58 17.5 12.7 14.7
```

```
summary(Juss)
```

```
##       LCB             LMS              LBM              LP
##  Min.   :129.0   Min.   : 64.0   Min.   :52.00   Min.   :16.70
##  1st Qu.:186.5   1st Qu.: 97.0   1st Qu.:67.25   1st Qu.:19.52
##  Median :212.0   Median :111.0   Median :72.50   Median :20.50
##  Mean   :204.8   Mean   :106.5   Mean   :72.55   Mean   :21.07
##  3rd Qu.:226.0   3rd Qu.:118.0   3rd Qu.:77.75   3rd Qu.:23.10
##  Max.   :255.0   Max.   :126.0   Max.   :95.00   Max.   :26.50
##        LM             LAM
##  Min.   :11.50   Min.   :13.00
##  1st Qu.:13.22   1st Qu.:15.05
##  Median :14.30   Median :16.90
##  Mean   :14.31   Mean   :16.91
##  3rd Qu.:15.15   3rd Qu.:18.45
##  Max.   :16.80   Max.   :27.00
```

(1) ACP normé ou non ?

```
Jussac <- Juss
save(Jussac, file = "Jussac.Rdata")
rm(Juss)
summary(Jussac)
```

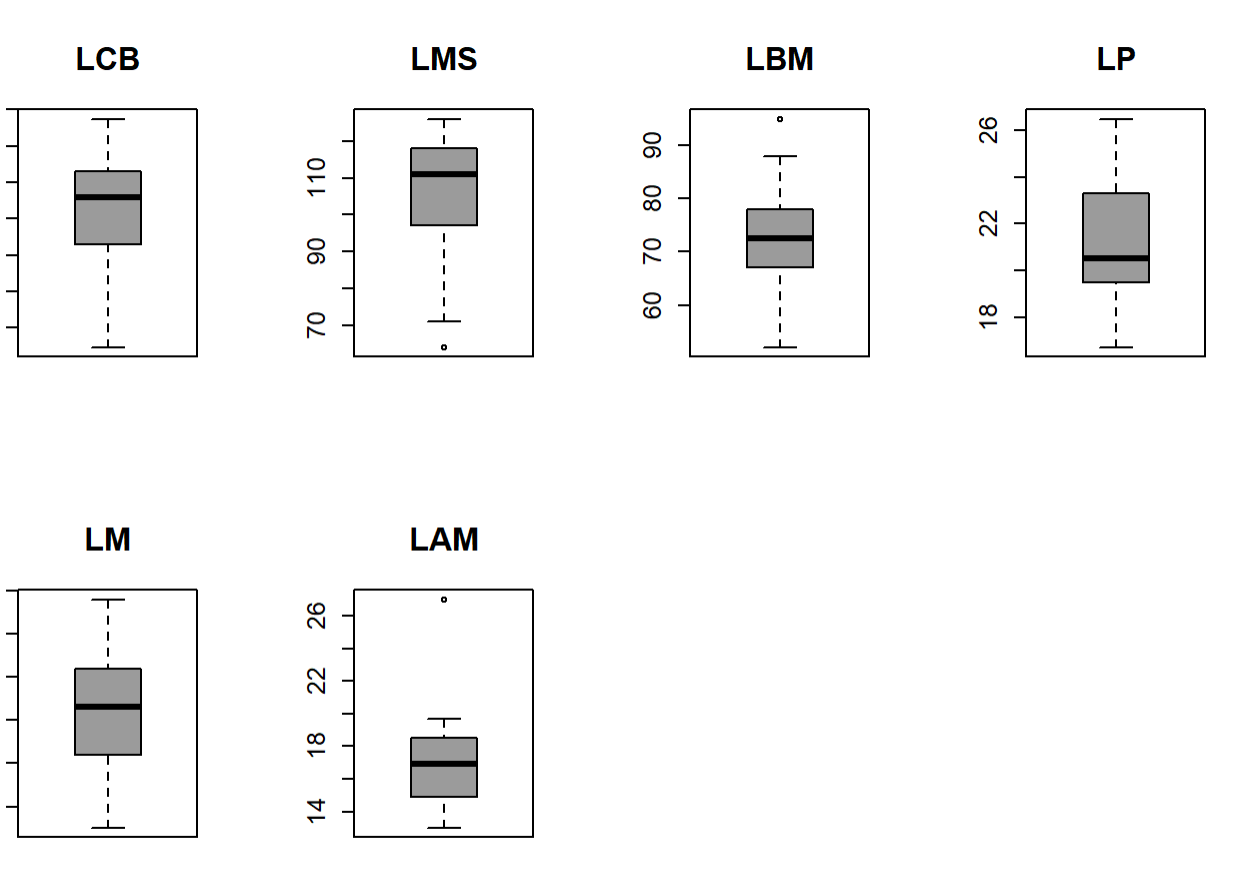
```
##       LCB             LMS              LBM              LP
##  Min.   :129.0   Min.   : 64.0   Min.   :52.00   Min.   :16.70
##  1st Qu.:186.5   1st Qu.: 97.0   1st Qu.:67.25   1st Qu.:19.52
##  Median :212.0   Median :111.0   Median :72.50   Median :20.50
##  Mean   :204.8   Mean   :106.5   Mean   :72.55   Mean   :21.07
##  3rd Qu.:226.0   3rd Qu.:118.0   3rd Qu.:77.75   3rd Qu.:23.10
##  Max.   :255.0   Max.   :126.0   Max.   :95.00   Max.   :26.50
##        LM             LAM
##  Min.   :11.50   Min.   :13.00
##  1st Qu.:13.22   1st Qu.:15.05
##  Median :14.30   Median :16.90
##  Mean   :14.31   Mean   :16.91
##  3rd Qu.:15.15   3rd Qu.:18.45
##  Max.   :16.80   Max.   :27.00
```

###(2) comme on ne sait pas Jussac on l'enleve

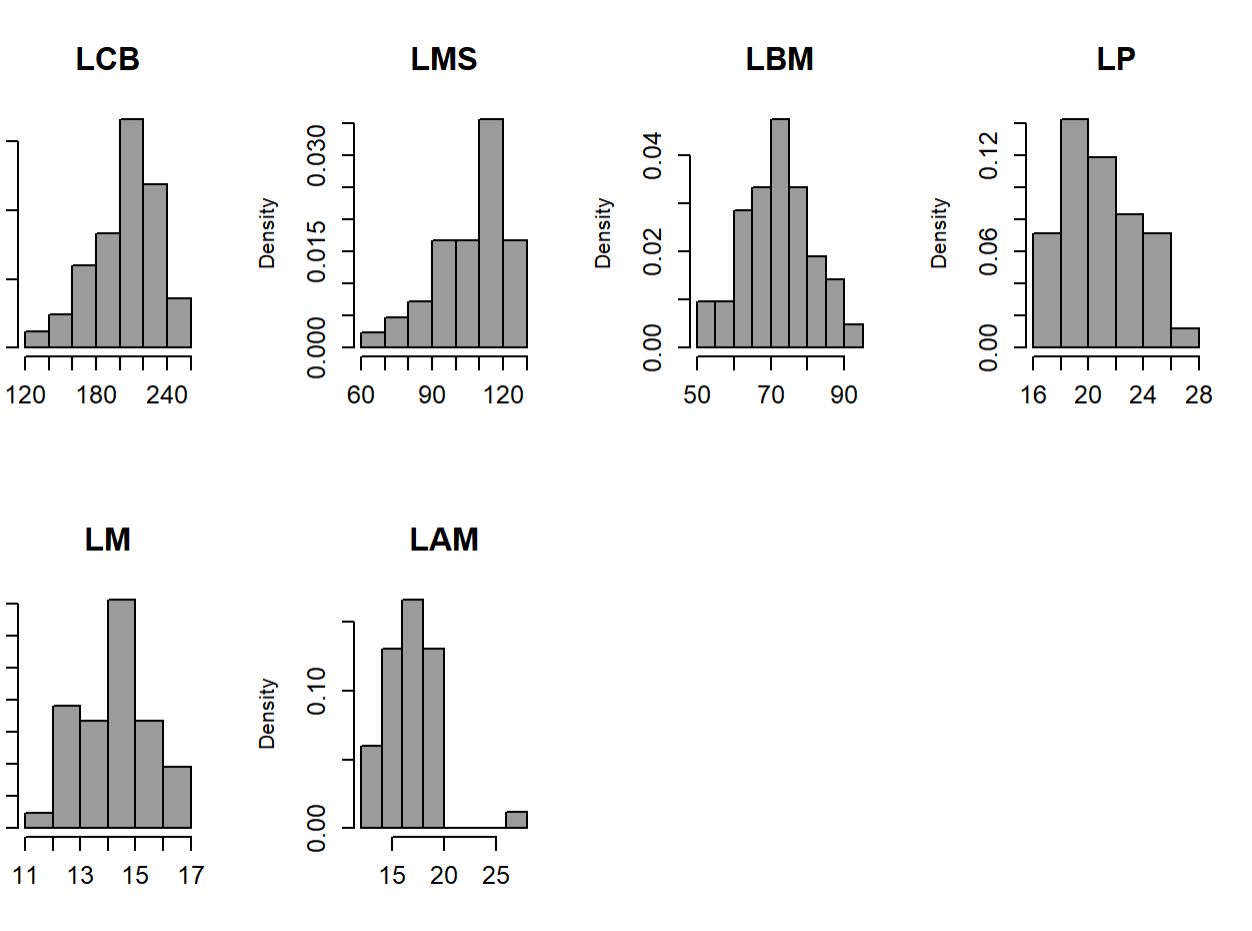
```
summary(Jussac)
```

```
##       LCB             LMS              LBM              LP
##  Min.   :129.0   Min.   : 64.0   Min.   :52.00   Min.   :16.70
##  1st Qu.:186.5   1st Qu.: 97.0   1st Qu.:67.25   1st Qu.:19.52
##  Median :212.0   Median :111.0   Median :72.50   Median :20.50
##  Mean   :204.8   Mean   :106.5   Mean   :72.55   Mean   :21.07
##  3rd Qu.:226.0   3rd Qu.:118.0   3rd Qu.:77.75   3rd Qu.:23.10
##  Max.   :255.0   Max.   :126.0   Max.   :95.00   Max.   :26.50
##        LM             LAM
##  Min.   :11.50   Min.   :13.00
##  1st Qu.:13.22   1st Qu.:15.05
##  Median :14.30   Median :16.90
##  Mean   :14.31   Mean   :16.91
##  3rd Qu.:15.15   3rd Qu.:18.45
##  Max.   :16.80   Max.   :27.00
```

```
par(mfrow=c(2,4))
for (j in 1:6){
  boxplot(Jussac[,j], col = 8, xlab="",
          cex.main=1.5, cex.axis=1.2,
          main=colnames(Jussac)[j])
}
par(mfrow=c(2,4))
```




```
for (j in 1:6){
  hist(Jussac[,j], col = 8, xlab="",
          cex.main=1.5, cex.axis=1.2,
          freq = FALSE,
          main=colnames(Jussac)[j])
}
```



On voit une valeur extreme pour LAM

```
print(apply(Jussac[,1:6], 2, var), 3) #,3 pour les 3 premiers decimaux
```

```
##    LCB    LMS    LBM     LP     LM    LAM
## 764.68 230.20  85.23   6.90   1.82   6.35
```

```
sdJussac <- apply(Jussac[,1:6],2,sd)
max(sdJussac)/min(sdJussac)
```

```
## [1] 20.48062
```

Etant donne une variance ~20x on va plutot faire une ACP normée meme si c'est de la meme unite

```
print(cor(Jussac[,1:6]), 3)
```

```
##       LCB   LMS   LBM    LP    LM   LAM
## LCB 1.000 0.961 0.349 0.615 0.713 0.620
## LMS 0.961 1.000 0.200 0.661 0.729 0.631
## LBM 0.349 0.200 1.000 0.370 0.367 0.396
## LP  0.615 0.661 0.370 1.000 0.897 0.818
## LM  0.713 0.729 0.367 0.897 1.000 0.857
## LAM 0.620 0.631 0.396 0.818 0.857 1.000
```

####(2) Cas de l'individu Jussac

On ne fait pas l'acp sur jussac on le met a la fin

###(3) ACP NORMEE

```
library(ade4)
```

```
## Warning: le package 'ade4' a été compilé avec la version R 4.4.3
```

```
acp <- dudi.pca(Jussac[,1:6], scale = T, scannf = F, nf=6)
names(acp)
```

```
##  [1] "tab"  "cw"   "lw"   "eig"  "rank" "nf"   "c1"   "li"   "co"   "l1"
## [11] "call" "cent" "norm"
```

```
head(acp$li)
```

```
##        Axis1      Axis2      Axis3        Axis4        Axis5       Axis6
## 100 3.918841  3.7534419  0.1569517  0.006358056  0.375464397 -0.30848262
## 101 1.911695  1.6386871 -1.3877007 -0.056263276 -0.489142253  0.12015502
## 102 2.531957  0.5736640 -0.1316323 -0.639764664  0.336701528 -0.01308251
## 103 1.581495  0.3991532  0.1760477  0.187166639  0.006082512  0.11283120
## 104 3.951741 -0.8560681 -0.5732074 -0.018365315 -0.013389862  0.22466983
## 105 3.006772 -0.7515107 -0.6083719 -0.353240451 -0.051339767 -0.16816647
```

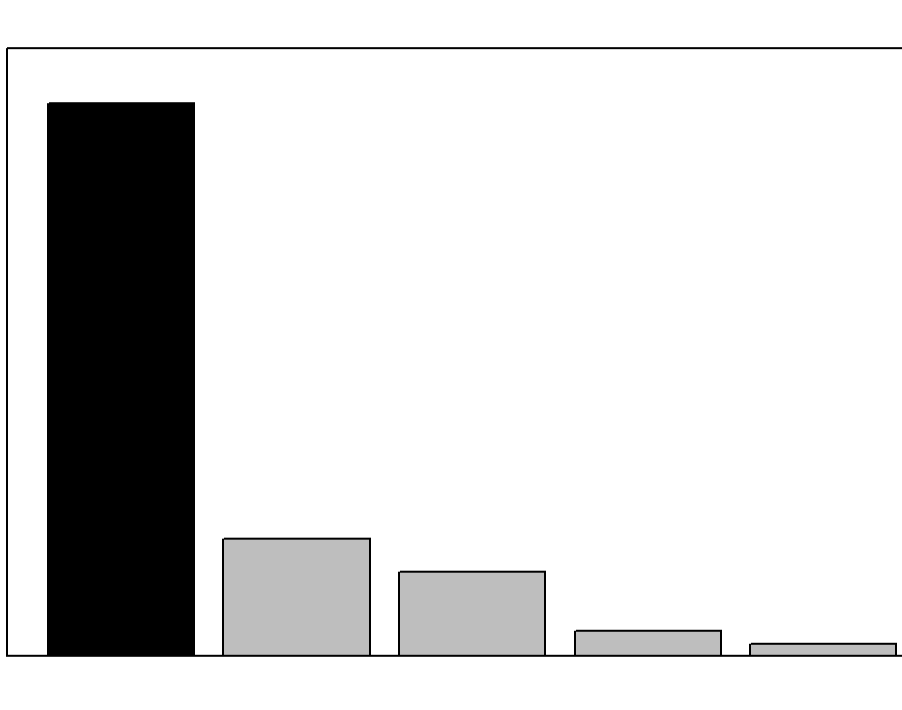
```
inertie<- inertia.dudi(acp, col.inertia = F, row.inertia = T)
names(inertie)
```

```
## [1] "tot.inertia" "row.contrib" "row.abs"     "row.rel"     "row.cum"
## [6] "nf"          "call"
```

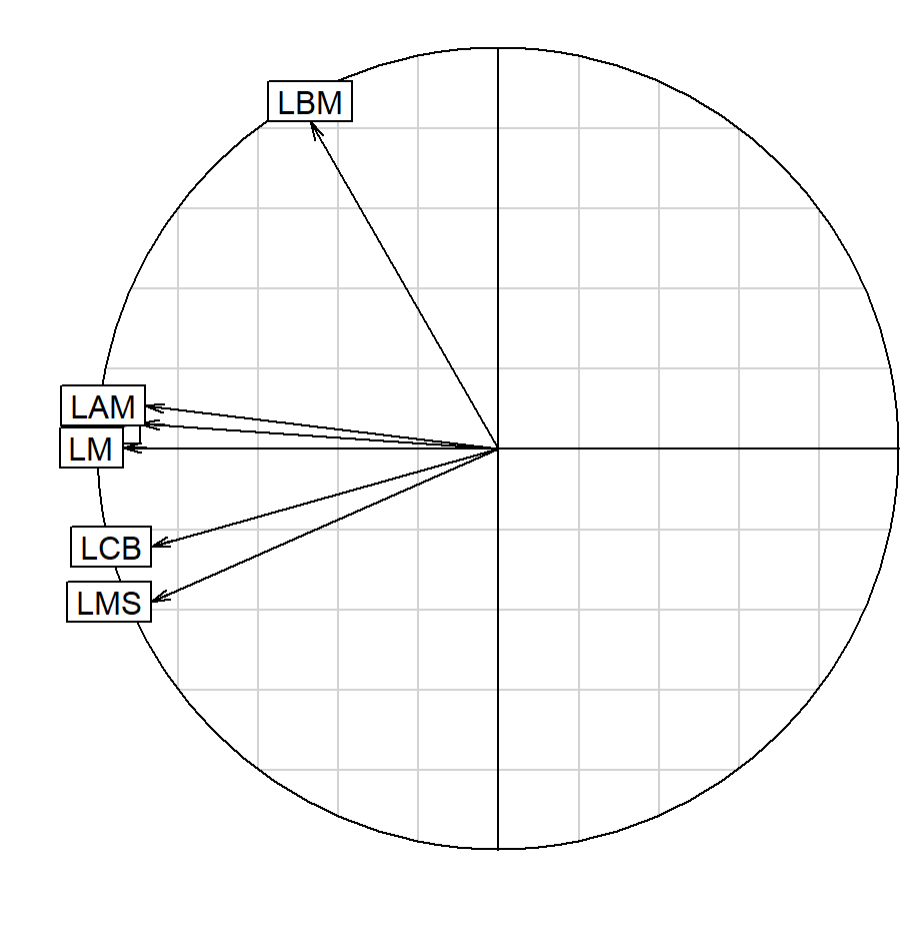
```
inertie$tot.inertia
```

```
##        inertia      cum    cum(%)
## Ax1 4.18174553 4.181746  69.69576
## Ax2 0.88606070 5.067806  84.46344
## Ax3 0.63415219 5.701958  95.03264
## Ax4 0.18667644 5.888635  98.14391
## Ax5 0.09102927 5.979664  99.66107
## Ax6 0.02033587 6.000000 100.00000
```

```
scatterutil.eigen(acp$eig, nf=6, box=T, sub = "")
```



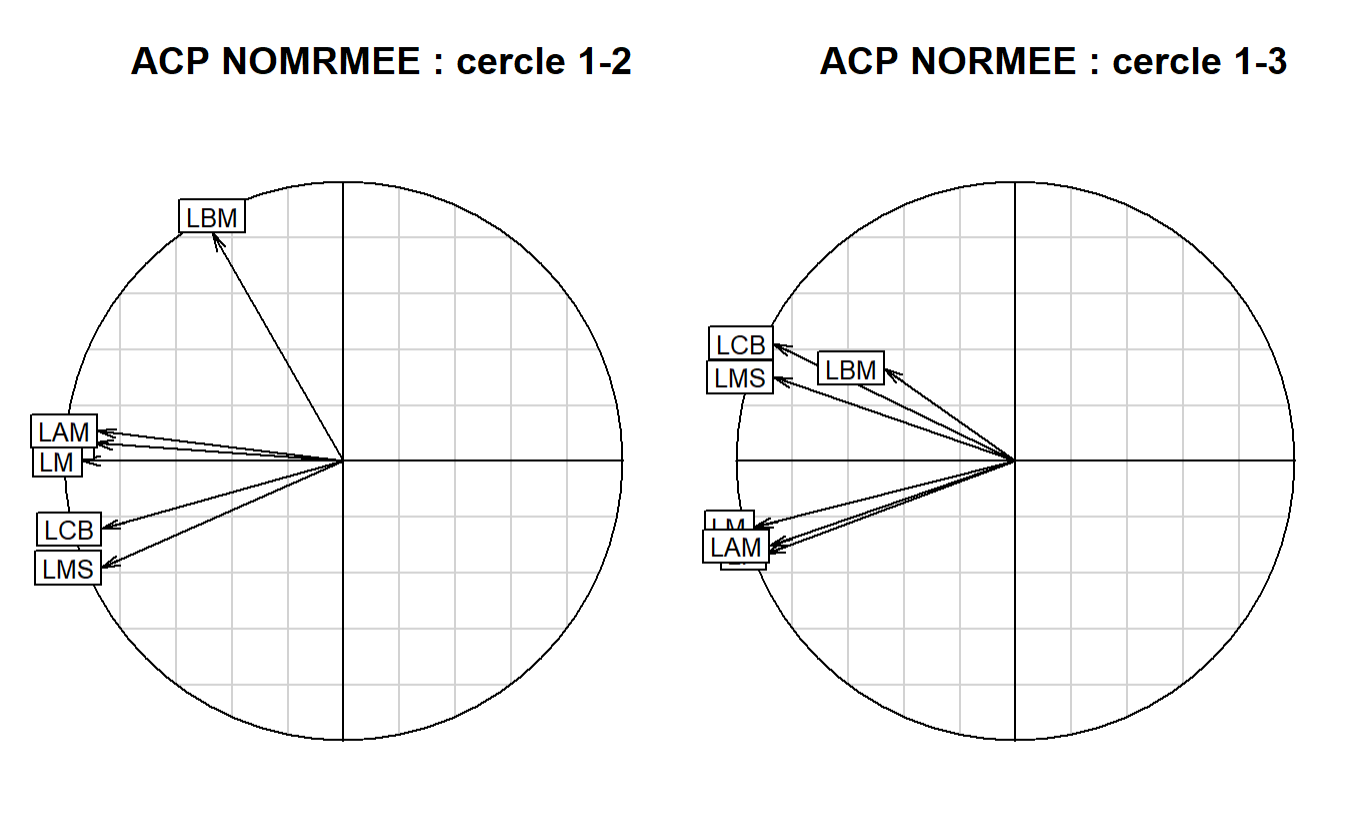
```
s.corcircle(acp$co, sub = "")
```




```
cc<-cor(Jussac[,1:6], acp$li)
cc
```

```
##          Axis1        Axis2      Axis3       Axis4       Axis5       Axis6
## LCB -0.8680243 -0.242622877  0.4209797 -0.02751941 -0.01302033  0.09755603
## LMS -0.8670224 -0.380757842  0.3005786  0.01290298  0.05494016 -0.09880879
## LBM -0.4714485  0.816324673  0.3324032  0.02214014  0.00228200 -0.01905421
## LP  -0.8934455  0.064386808 -0.3292898  0.25514423  0.15346066  0.02299963
## LM  -0.9370238  0.003238772 -0.2356600  0.07724453 -0.24558553 -0.01269761
## LAM -0.8820596  0.108056373 -0.3035153 -0.33793069  0.06303716  0.00149713
```

```
par(mfrow=c(1,2))
# Cercle principal (adapter clabel taille des noms de var)
s.corcircle(cc, clabel=0.8, sub="Cercle de correlations")
title("ACP NOMRMEE : cercle 1-2")
#next ... si besoin
s.corcircle(cc, yax=3, clabel=0.8)
title("ACP NORMEE : cercle 1-3")
```



CERCLE 1-2

```
inertie$row.cum #cos2 cumules (%)
```

```
##           Axis1   Axis1:2  Axis1:3  Axis1:4  Axis1:5 Axis1:6       Axis7:6
## 100 51.69690432 99.122045 99.20497 99.20511 99.67966     100  0.000000e+00
## 101 42.88177525 74.390271 96.98604 97.02319 99.83060     100  0.000000e+00
## 102 88.05978140 92.580215 92.81822 98.44041 99.99765     100  0.000000e+00
## 103 91.30725499 97.123582 98.25502 99.53389 99.53524     100  1.110223e-14
## 104 93.35026137 97.731081 99.69518 99.69719 99.69826     100  0.000000e+00
## 105 89.23549707 94.810012 98.46323 99.69485 99.72086     100  2.220446e-14
## 106 14.37285392 91.591617 95.45073 97.40233 99.66621     100  4.440892e-14
## 107 82.26423187 98.448260 98.65951 99.57968 99.75241     100  1.110223e-14
## 108  3.28303669 86.316896 92.43963 97.67589 99.33942     100 -4.440892e-14
## 109 18.84160457 94.449149 94.45359 94.54918 98.09863     100  0.000000e+00
## 110 65.34106478 95.430581 97.90253 99.54122 99.71438     100  0.000000e+00
## 111  9.44544866 87.750587 95.22823 95.83212 99.85423     100 -2.220446e-14
## 112  0.03796426 41.775876 93.20099 93.81703 98.38383     100 -2.220446e-14
## 113 33.69387413 52.538966 70.57431 99.22139 99.53501     100  1.110223e-14
## 114  0.34761790  1.207752 92.12873 98.11228 99.16494     100  3.330669e-14
## 115 12.80961789 95.028232 95.67355 96.37836 97.68584     100  4.440892e-14
## 116 64.78860664 64.846476 86.48537 86.54307 99.49573     100  0.000000e+00
## 117  0.60764008 82.719621 87.63847 95.97556 97.70603     100  0.000000e+00
## 118 66.57519364 85.597398 93.01228 99.37526 99.39586     100  3.330669e-14
## 119  2.81028045  9.947588 78.66209 81.95504 99.80600     100  4.440892e-14
## 120 61.17284676 72.831401 76.09263 76.16029 99.05361     100 -2.220446e-14
## 121 74.15931435 83.320405 96.98053 96.99612 99.31268     100  0.000000e+00
## 122 91.74049469 97.832886 98.15293 98.18769 99.30380     100 -2.220446e-14
## 123 60.05865046 61.573117 99.21967 99.62810 99.74910     100  2.220446e-14
## 124 45.30825587 56.420214 95.72392 96.03753 97.55224     100  4.440892e-14
## 125 62.06548042 65.727092 89.83182 90.20604 99.68772     100  0.000000e+00
## 126 86.96535298 98.852448 99.05046 99.87365 99.92816     100  1.110223e-14
## 127 50.42959998 61.228781 97.14146 99.81994 99.83547     100  3.330669e-14
## 128 54.68440621 92.641181 97.75305 98.56333 99.97742     100  1.110223e-14
## 129 44.07168970 48.268809 89.68527 91.84769 99.99834     100  2.220446e-14
## 200 41.16333563 46.009210 97.49967 97.64249 99.96211     100 -2.220446e-14
## 201 89.39013288 89.678442 90.61020 95.73654 99.21359     100  0.000000e+00
## 202 84.98710971 88.418779 90.00084 93.67305 99.86427     100 -2.220446e-14
## 203 93.80491826 96.456371 96.90500 99.02984 99.85499     100  0.000000e+00
## 204 95.90657206 95.988324 96.38240 96.38240 99.91586     100  0.000000e+00
## 205 79.90430912 79.939240 91.57173 97.67818 99.84969     100  0.000000e+00
## 206 14.31956108 15.558860 97.12751 97.69450 99.67662     100 -2.220446e-14
## 207  8.41845024 30.365389 92.53964 97.79604 99.17105     100 -2.220446e-14
## 208 76.41016362 76.576476 84.51890 99.69145 99.95714     100  1.110223e-14
## 209 49.52630346 50.866374 97.53116 97.59586 99.97090     100  0.000000e+00
## 210 83.14646897 84.457791 94.65970 98.54814 99.38827     100  2.220446e-14
## 211 85.94672678 86.157439 93.27691 99.78064 99.95166     100 -2.220446e-14
```

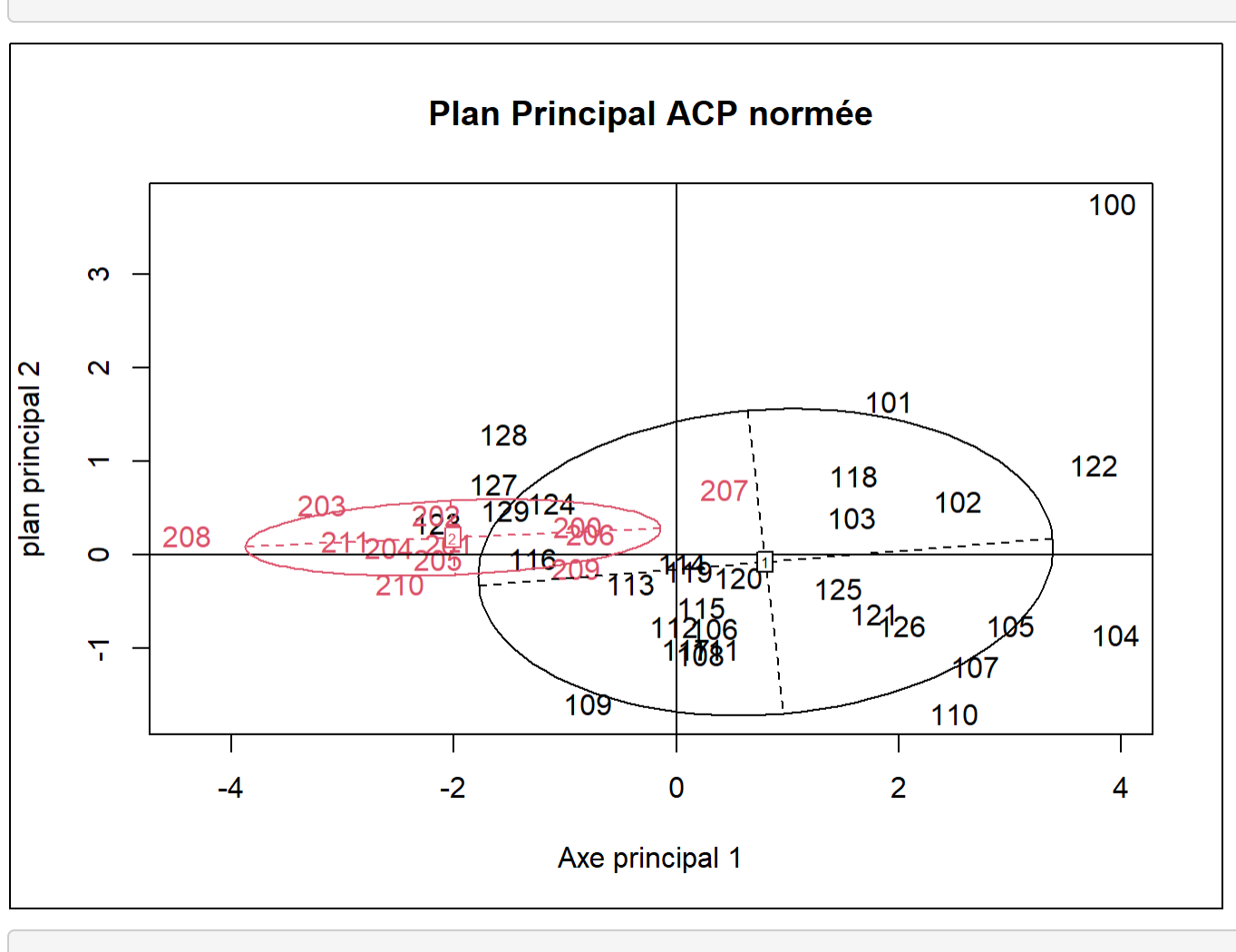
dans le plan principal : colonne Axis 1:2

```
cos2<- inertie$row.cum[,2]
```

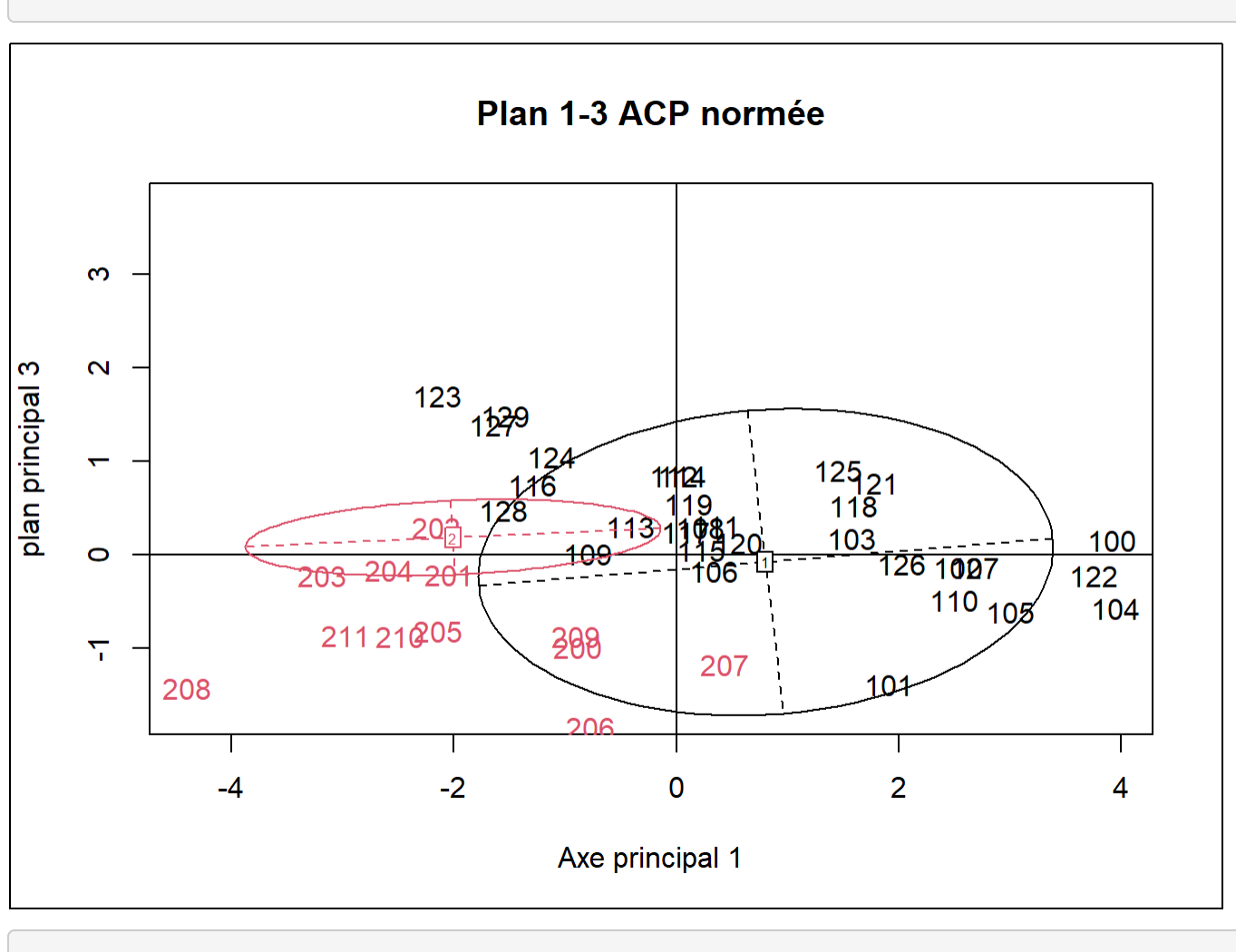
cos2 cumules plan principal en %

```
cos2lab <- 1.*cos2/100
```

```
#plan principal avec CSP en facteur supp
# labels individus colores par CSP
# coloration par CSP
# barycentres/classes avec s.class
#cf Mise à nive stat et R
#la fonction s.class ne donne pas les labels individus
plot(acp$li$Axis1, acp$li$Axis2, type="n",
     xlab = "Axe principal 1", ylab="plan principal 2")
text(acp$li$Axis1, acp$li$Axis2, row.names(Jussac),
     col = as.numeric(TP))
abline(h=0); abline(v=0) #barycentre du nuage
## barycentres/ classes avec s.class
colTP <- seq(1, length(levels(TP)))
s.class(acp$li, fac=TP, cstar=0, cpoint = 0, clabel = 0.5,
        col=colTP, axesell = T, add.plot = T)
title("Plan Principal ACP normée")
```

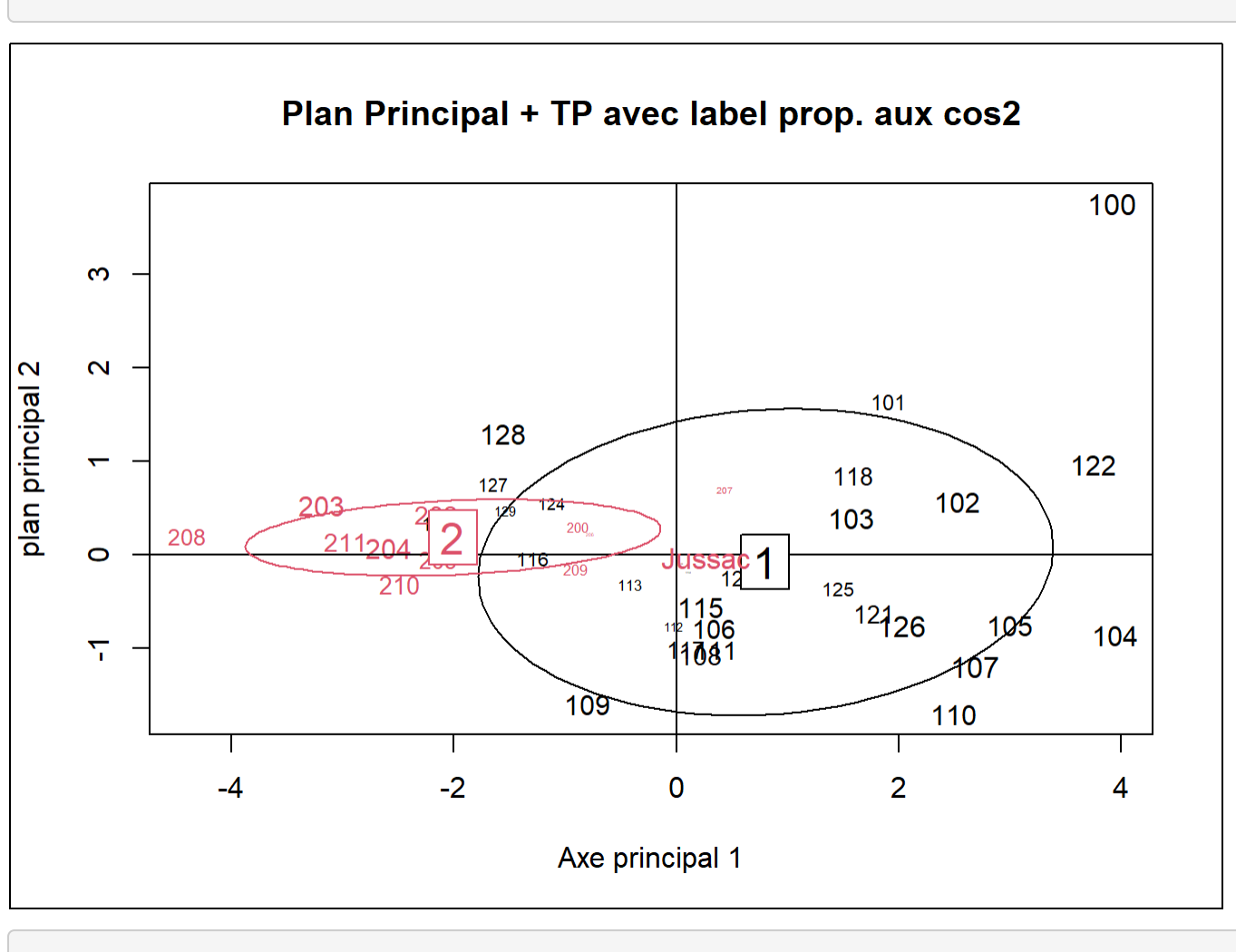



```
plot(acp$li$Axis1, acp$li$Axis3, type="n",
     xlab = "Axe principal 1", ylab="plan principal 3")
text(acp$li$Axis1, acp$li$Axis3, row.names(Jussac),
     col = as.numeric(TP))
abline(h=0); abline(v=0) #barycentre du nuage
## barycentres/ classes avec s.class
colTP <- seq(1, length(levels(TP)))
s.class(acp$li, fac=TP, cstar=0, cpoint = 0, clabel = 0.5,
        col=colTP, axesell = T, add.plot = T)
title("Plan 1-3 ACP normée")
```

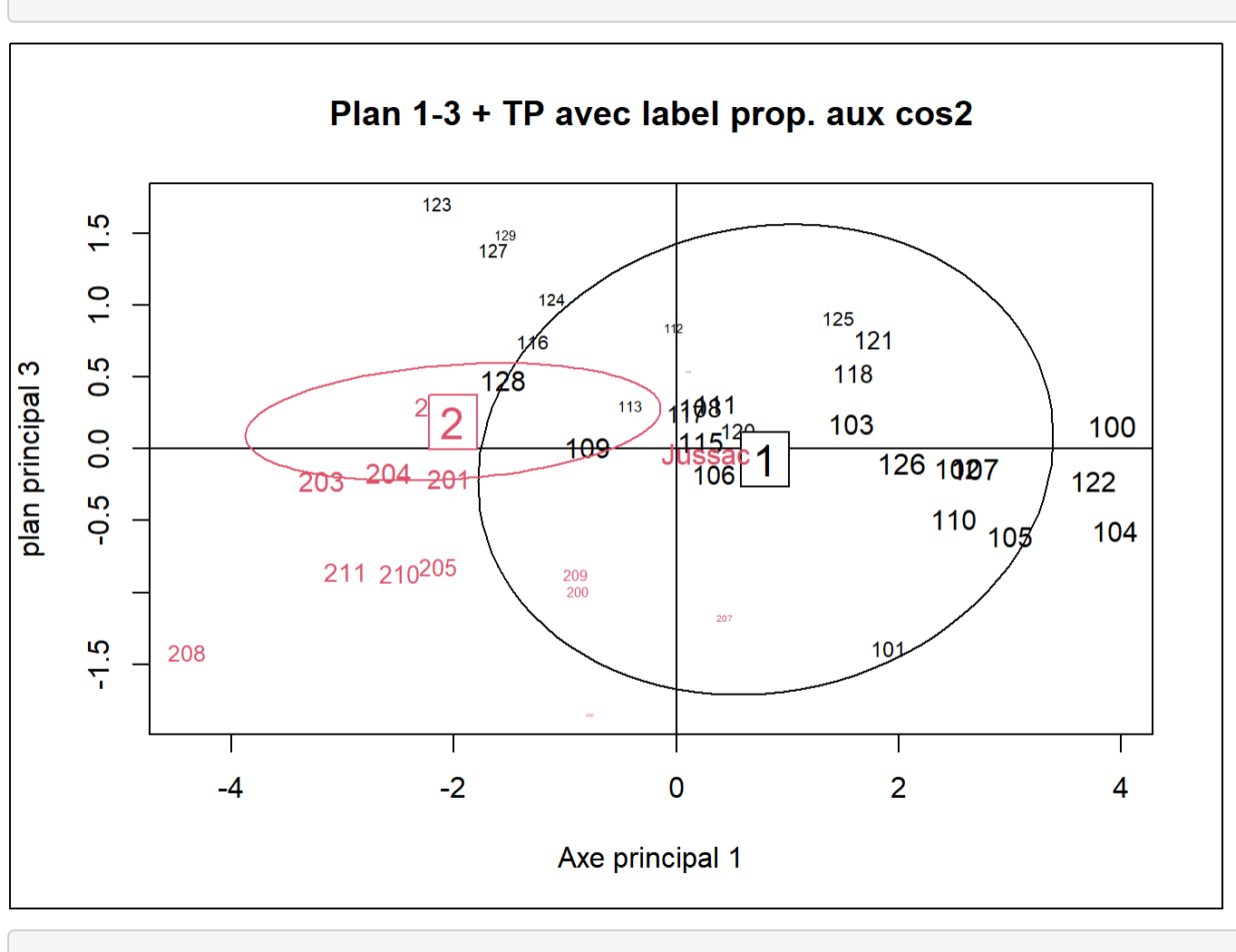



```
Jussac_c = suprow(acp,J)$lisup

plot(acp$li$Axis1, acp$li$Axis2, type="n",
     xlab = "Axe principal 1", ylab="plan principal 2")
text(acp$li$Axis1, acp$li$Axis2, cex=cos2lab, labels = row.names(Jussac),
     col = as.numeric(TP))
abline(h=0); abline(v=0)
colTP <- seq(1, length(levels(TP)))
s.class(acp$li, fac=TP, cstar=0, cpoint = 0, clabel = 1.5,
        col=colTP, axesell = F, add.plot = T)
text(Jussac_c$Axis1, Jussac_c$Axis2, 'Jussac', col = 2)
title("Plan Principal + TP avec label prop. aux cos2")
```

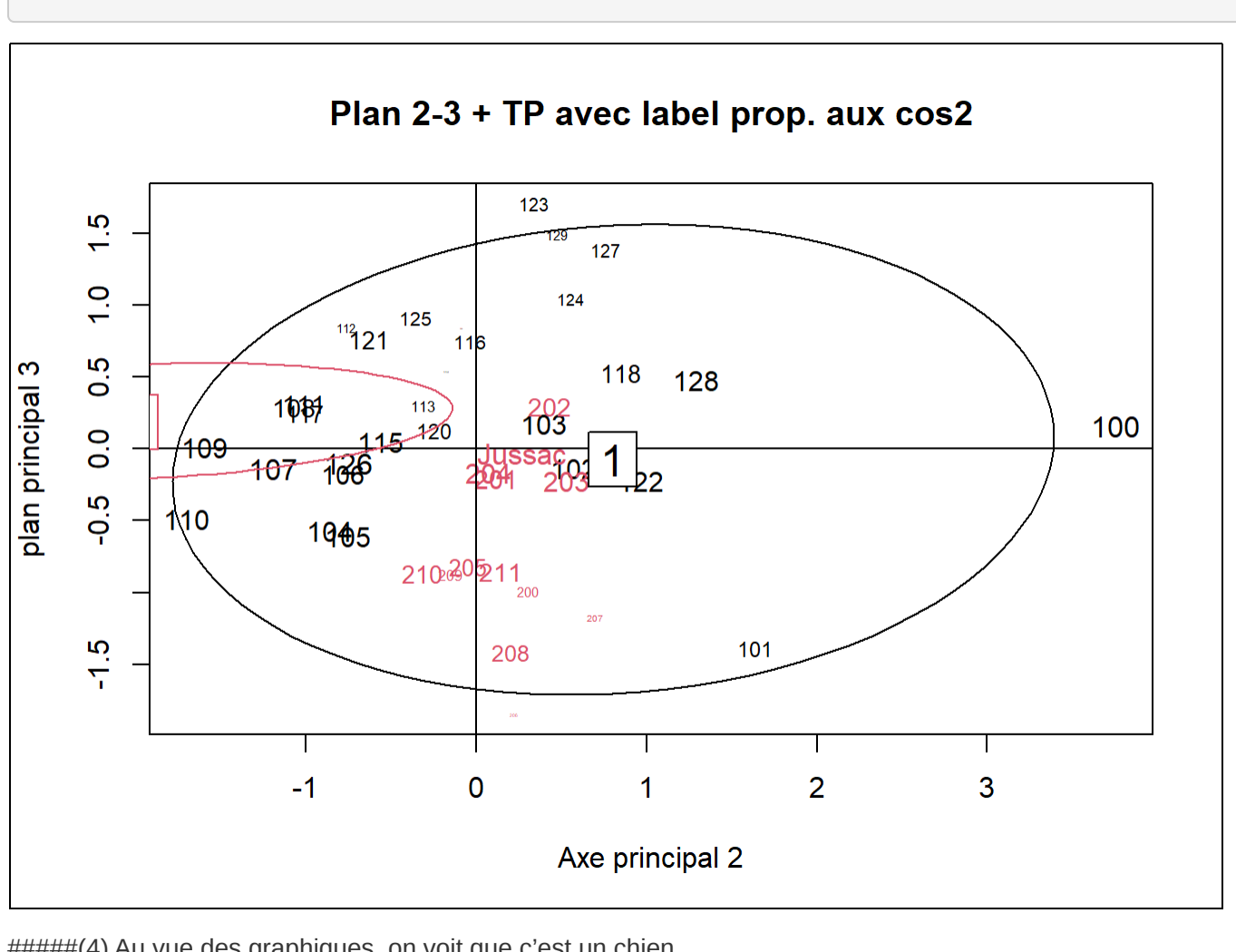



```
plot(acp$li$Axis1, acp$li$Axis3, type="n",
     xlab = "Axe principal 1", ylab="plan principal 3")
text(acp$li$Axis1, acp$li$Axis3, cex=cos2lab, labels = row.names(Jussac),
     col = as.numeric(TP))
abline(h=0); abline(v=0)
colTP <- seq(1, length(levels(TP)))
s.class(acp$li, fac=TP, cstar=0, cpoint = 0, clabel = 1.5,
        col=colTP, axesell = F, add.plot = T)
text(Jussac_c$Axis1, Jussac_c$Axis2, 'Jussac', col = 2)
title("Plan 1-3 + TP avec label prop. aux cos2")
```




```
plot(acp$li$Axis2, acp$li$Axis3, type="n",
     xlab = "Axe principal 2", ylab="plan principal 3")
text(acp$li$Axis2, acp$li$Axis3, cex=cos2lab, labels = row.names(Jussac),
     col = as.numeric(TP))
abline(h=0); abline(v=0)
colTP <- seq(1, length(levels(TP)))
s.class(acp$li, fac=TP, cstar=0, cpoint = 0, clabel = 1.5,
        col=colTP, axesell = F, add.plot = T)

text(Jussac_c$Axis1, Jussac_c$Axis2, 'Jussac', col = 2)
title("Plan 2-3 + TP avec label prop. aux cos2")
```



#####(4) Au vue des graphiques, on voit que c'est un chien